DESIGNING PROBLEM-CENTERED HIPS

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“EITHER WE TEACH OUR CHILDREN, OR WE ABANDON THE FUTURE TO CHANCE AND NONSENSE”
CHANCE AND NONSENSE 2016

• Vaccines misinformation
• Global warming and climate change deniers
• Evolution/creationism “debate”
• Missouri senatorial candidate on “legitimate rape” and pregnancy
• Ebola “crisis” in America
• Texas rep. L. Smith searching for ”questionable” NSF awards not “in national interest”
• The War On Science (National Geographic, 2015) “Skepticism about science is on the rise, and polarization is the order of the day.”
Beginning in school, and continuing at successively higher levels across their college studies, students should prepare for 21st century challenges by gaining:
KNOWLEDGE OF HUMAN CULTURES AND THE PHYSICAL AND NATURAL WORLD

Through study in the sciences, mathematics, social sciences, humanities, histories, languages, and arts

Focused by engagement with big questions, both contemporary and enduring
INTELLECTUAL AND PRACTICAL SKILLS

- Inquiry and analysis
- Creative and critical thinking
- Written and oral communication
- Quantitative and information literacy
- Teamwork and problem-solving

Practiced extensively, across the curriculum, in the context of progressively more challenging problem-solving, projects, and standards of performance.
PERSONAL AND SOCIAL RESPONSIBILITY

- Civic knowledge and engagement – local and global
- Intercultural knowledge and competence
- Ethical reasoning and action
- Foundations and skills for lifelong learning

Anchored through active involvement with diverse communities and real-world challenges
INTEGRATIVE AND APPLIED LEARNING

Synthesis and advanced accomplishment across general and specialized studies

Demonstrated through the application of knowledge, skills, and responsibilities to new settings and complex problems
SUCCESSFUL PARTICIPATION IN HIPs

- Increases retention and graduation rates (biggest gains for historically disadvantaged students)
- Leads to more positive attitudes about college, faculty, learning, and students themselves
- Promotes greater engagements in deep learning and self-reported gains in learning
WHAT IS DEEP LEARNING?

STUDENTS…

- Understand and appreciate the dimensions of a problem
- Get at underlying meaning of information
- Integrate and synthesize different ideas from different sources
- Discover patterns in evidence or phenomena
- Apply knowledge in different situations
- View issues from multiple perspectives
THERE ARE TWO KINDS OF PROBLEMS

1. THE KIND THAT NEED FIXING

2. THE KIND THAT CAN BE USED AS A FOCUS OF A HIP
DESIGNING SOLUTIONS TO YOUR PROBLEM

High-Impact Practice

Activity 1

Activity 2

Activity 3

Student outcome

What are desired?

INSTITUTIONAL PROBLEM AT UNIVERSITY, PROGRAM, OR COURSE LEVEL

That helps solve

Assessment
CREATING HIGH-IMPACT ACTIVITIES WITHIN HIGH-IMPACT PRACTICES

High-Impact Practices

- First-Year Seminar
- Undergrad Research
- Learning Community
- Capstone
- Internships
- Writing Intensively
- Common Intellectual Experiences
- Service Learning
- Diversity/Global Learning
- Collaborative Assignments

Student oral presentation on research

Features that matter

High-Impact Activities

- Students collect data without any analysis

INSTITUTIONAL PROBLEM
Graduates Not Getting Employed

Improved communication skills

Assessment
PROBLEMS AS FOCI OF HIPS
WHAT IS THE SCOPE OF THE PROBLEM TO BE INVESTIGATED?

1. Individual Students in One Course
2. All the Students in One Course
3. Students in Multiple Sections of One Course
4. Students in Interdisciplinary Courses
5. Students within College or University
WHAT IS THE SCOPE OF THE PROBLEM?

Estimated Length of Project (One week, semester-long)

On-campus or off-campus, or some combination

What product will students produce?

What is your formal assessment?
WARNING!

The Complexity Of Managing Operations of the Problem-Centered HIP Increases Exponentially With Greater Scope!

So, you might consider starting out small and then ramping up
WHY DO HIPS WORK?

• Create Engaged and Supportive Community
• Involve Students in Purposeful Learning
• Connect Learning with Big Questions and Real-World Settings
• Require Higher Order Inquiry, Exploration, and Problem Solving
• Engage Diversity as a Resource for Learning
HOW DO WE OVERCOME THESE STATISTICS?

90% OF HIGH SCHOOL STUDENTS BELIEVE THAT GETTING A GOOD GRADE IS IMPORTANT

6% CARE ABOUT LEARNING

PRINCETON REVIEW, Student Life in America Survey, 2015
CHARACTERISTICS OF A “GOOD” PROBLEM

*Internal Vs. External Driving Forces*

**Internal**---”Need to Know” Situations

**External**---Instructor(s) Make Choices
CHARACTERISTICS OF A “GOOD” PROBLEM

From PBL.....

Students are given freedom to choose topics that interest them the most and to determine how they want to study them—could be directly related to issue on campus. The problem has meaning to students.

Learning is driven by challenging, complex, open-ended problems with no one right answer that provoke discussion; problems generate interest and controversy and cause the students to ask questions.

Problems may have multiple solutions and require students to review different methods before deciding on a plan of action.
CHARACTERISTICS OF A “GOOD” PROBLEM

Students learn a set of important content, concepts, ideas, and techniques professionally relevant to experts in the field—students know that knowledge gained will be useful to them in the future.

Students must be metacognitively aware—what do they know, what do they need to know to solve the problem, and what strategies should they use? Students gain a “knowledge inventory” of problem---what is already known and what needs to be known?

Students work as self-directed, active investigators and problem-solvers (often in small groups).

Student competencies are a focus.
Desirable Competencies of Successful Students

- Ask unique/relevant questions
- Survey a field and find an empty niche
- Apply knowledge to new situations
- Explain information in their own words
- Make connections between ideas or concepts
- Appreciate, accept, and use evidence
- Be creative and innovative
- Work well with others
- Understand and use the investigative process of the discipline (research savvy)
- Use critical thinking skills effectively and often
Critical Thinking Skills

- Observe and Ask Good Questions
- Hypothesize and Predict
- Design an Investigation
- Collect, Process, and Interpret Data
- Draw Conclusions
- Infer and Generalize
- Communicate/Discuss
- Relate Cause and Effect (vs. correlation)
- Recognize Assumptions and Evaluate
- Apply Knowledge to New Situations
- Determine What You Don’t Know
WHAT DO FACULTY/STAFF DO?

**Faculty/staff**

Facilitate and Emphasize Learning for Understanding, Not Recall

Provide Context for Problem; Identify Resources That Inform Students’ Thinking About the Problem

Guide The Learning Process and Student Exploration By Setting Ground Rules, Identifying Potential Difficulties, and Developing Learning Objectives

Model Inquiry Strategies

Help Students Clarify and Refine Research Questions

Facilitate and Monitor Group Work
FINDING AN APPROPRIATE PROBLEM

Can You Begin with an Essay Question from an Exam That Could Be Expanded?

What Are Current Questions, Problems, Issues, Debates in Your Discipline?

What’s in the Campus/Local/Regional/National News?

Is There an Aspect of Your Own Research in which Students Could Become Engaged?

What Are the Student-generated Ideas?

What Would Be a Basic Investigation within Your Discipline?
AN INDEPENDENT INVESTIGATION

BACKGROUND

How can you tell if your houseplants need fertilizer? How well would your plants grow if you added twice the recommended amount of fertilizer to your houseplants or to those in your garden? What plants are the birds eating in your backyard, and are they eating seeds, fruits, or insects? How hot does the soil get in the sun next to a tree compared to the soil in the shade, and how does this affect root growth? These are questions that you might ask every day about phenomena you see in the world around you. But how might you answer these questions? The independent investigation is your opportunity to study some small part of your natural world and to answer one of your own questions.

There are four main steps to your project:
1) Select and outline a research problem.
2) Design an investigation.
3) Conduct the investigation.
4) Write the project report.

Your investigation can be either an experiment or an observational study. In an experiment you will manipulate part of the environment you are studying to answer a question. This manipulation may include a setup with control and variable conditions. In an observational study you will not change the conditions of the environment nor create controlled and experimental situations. For instance, if you observe the kind and number of individual insects that visit the flowers of a particular species of plant in a field near your house, you are doing an observational study. However, you are doing an experiment if you remove petals from some flowers and not from others of the same species to determine if insects are attracted to the flowers by the petals.

Either kind of study, observational or experimental, is satisfactory for this project. Whichever you choose, there are several skills you will be asked to develop and use. The first skill is to formulate a research problem that you can answer based on your observations of the world. You are not expected to win a Nobel prize with your work. It is important, however, that the project be well-designed and conducted properly. Once you have an idea for a research problem you would like to study, you need to decide on the method of investigation. You must be able to complete your project with limited materials and time. Set up your study and then begin collecting data systematically and thoroughly. The data you collect will be processed, interpreted, and then incorporated into a written-up of the results of your investigation. The final skill involved is the writing of the report.

Selecting and Outlining a Research Problem

First, choose an area of interest. Do you like to work indoors or outdoors? Do you like anatomy, or physiology, or plant-animal interactions? Do you like to work with
Plants grow to Christian music, die to rock-and-roll

Feature by Lisa Gonshor

What kind of music do plants prefer? That's what Johnson, daughter of Johnson, secretary for the Child Development Center, has been studying in a science project. She found that cow peas have a definite affinity for Christian music and a real aversion to rock-and-roll.

The project consisted of planting three cow peas in identical soil and keeping them in like environments with identical care. They differed only in the types of music and lighting to which they were exposed. The study lasted two weeks.

Peas exposed to Christian music were in direct lamplight. Those exposed to easy listening music were in an open lighted area. Country-and-western peas were in direct sunlight, and the rock-and-roll peas had indirect fluorescent lighting.

The results of the experiment showed that the cow peas exposed to Christian music budded first and had the largest leaves. Those exposed to easy listening music were second, followed by the country-and-western. said the peas exposed to rock-and-roll died.

A freshman at Life Christian School, received second place for her project in her division of the school's science fair this year. She said she got the idea for her project from one of her science teachers in the seventh grade. She said when she first heard about the idea of particular types of music influencing plant growth, she thought it was stupid. Some of her classmates were also skeptical, she said.

They thought it was stupid until they saw the results.

said the project was interesting for her because she was able to see the effects that various types of music have on plants, or at least on cow peas.
INDEPENDENT PROJECT PROPOSAL

MATERIALS:
I will require seeds for bean plants.
In addition to this, I will need five pots. The types of soil that I will use include regular soil, powdered, and soil (RED) from outside.

PROCEDURES:
I will put three seeds in each of the five pots. The pots will contain different kinds of soil. I will test these plants by comparing them with each other under several different conditions.

CONDITIONS: The different conditions that will be observed are different amounts of water, different soils, different amounts of light, different temperatures, and to observe the benefits or disadvantages of using or not using special growth minerals.

GOAL: To be able to report on the different growth patterns of a bean plant under several conditions.

Exactly what are you going to do? You have not too many variables!
**HOW DO YOU ASSESS PROBLEM-CENTERED HIPS?**

What Is The Quality Of The Product And Student Presentation?

Peer Assessment---for Group Work—How Much Did Each Student Contribute?

Self-evaluation Of Work

Measure “Knowledge Inventory” Of Problem—What Did Students Learn About The Subject?

EXAMPLE

SHOULD GUNS BE ALLOWED ON CAMPUS?

Is this a good problem for your students to work on?

What are the advantages?

What are the disadvantages?

What might be a better problem---How do we make the campus safer for all?
LET’S GROUP TABLES BY SIZE/SCOPE OF PROBLEM

Describe the general aspects of the problem you want students to work on at your institution.

Talk with your group about what you think makes this a good problem, what potential difficulties might occur in terms of organizing students to investigate problem and potential issues with which students might be confronted.